9504

Internal Letter

Rockwell International

Date · September 4, 1987

No. · PWE9-03

TO (Name, Organization, Internal Address)
· CERCLA Feasibility Study Team
·
·

FROM (Name, Organization, Internal Address, Phone)
· P. W. Edrich
· Waste Proc & Inst Engr
· Building 130
· 7752

SUBJECT · SOIL EXCAVATION AND OFFSITE DISPOSAL ALTERNATIVE SCOPE AND ESTIMATE

This letter summarizes the excavation and offsite disposal alternative for CERCLA cleanup of contaminated soils at the Building 881 hillside. The sizes, volumes, and geological data discussed in this letter have been extracted from B. P. Doty's memorandum to T. C. Greengard, dated August 12, 1987.

SOLID WASTE MANAGEMENT UNITS (SWMUs) 103, 106, AND 107

Due to their close proximities, these SWMUs will be treated as a single unit. The areas to be excavated are shown on Enclosure 1 and are identified as Area 1 and Area 2.

Area 1

Area 1 is a 145 ft by 155 ft area to be excavated to a 4-ft depth. The 4 ft of depth to be excavated consists of 2 ft of gravel and 2 ft of claystone bedrock. Excavation of this area would be accomplished by front-end loaders for the first 2 ft and backhoes and front-end loaders for the 2 ft of bedrock. At this depth of excavation, vertical walls could be maintained; therefore, no shoring of walls or backsloping would be required.

After excavation, the soil would be loaded into plastic-lined, 21-ton dump trucks and transported to a hazardous waste landfill in Grassy Mountain, Utah, for disposal. The excavated area would then be backfilled with uncontaminated soils from elsewhere on plantsite. The surface would be compacted by the vehicles being used for backfilling the area. Finally, the surface of the excavated area would be graded and revegetated.

The total cost of the alternative, including excavation, disposal, shipping, backfilling, and revegetation, is $1,135K. A cost breakdown of this activity and the assumptions used are shown on Enclosure 4.

Area 2

Area 2 is a 180 ft by 60 ft area to be excavated to a depth of 17 ft. The 17 ft of depth consists of 15 ft of gravel and 2 ft of claystone bedrock. Similarly to Area 1, excavation of the gravel would be accomplished with front-end loaders, and excavation of the bedrock would also require backhoes. At this depth of excavation, the walls of the pit would have to be backsloped at a 1:1 grade to maintain stability. Also at this depth of excavation, some seepage of groundwater may be encountered, so two sump pumps will be provided.

After excavation, the contaminated soil would be transported by truck to a hazardous waste landfill in Utah for disposal.

The soil excavated for the backsloping walls could be used for backfilling the pit. The remainder of the pit would be backfilled with uncontaminated soils from elsewhere on plantsite. The entire area would be compacted by the vehicles used for backfilling. Finally, the surface of the excavated area would be graded and revegetated.

The total cost of this alternative is $2,328K. A cost breakdown is shown on Enclosure 5.

SWMU 119.1

SWMU 119.1 is a triangular-shaped area requiring excavation to an average depth of 10 ft. A sketch of this area and volume calculations are shown on Enclosures 2 and 3.

Excavation of gravel in this large area would be accomplished with scrapers and front-end loaders, and excavation of bedrock would also require backhoes. At this depth of excavation, the walls of the excavated area would have to be backsloped at a 1:1 grade to maintain stability. Four sump pumps would be required to remove any seepage of groundwater.

After excavation, the contaminated soil would be transported by truck to a hazardous waste landfill in Utah for disposal. The soil excavated for the backsloping walls, plus other soil from plantsite, would be used for backfilling, being compacted by the earth moving equipment. The surface of the excavated area would be graded and revegetated.

The total cost of this alternative is $10,389K. A cost breakdown is shown in Enclosure 6.

Pamela W. Edrich

P. W. Edrich
Waste Process & Instrumentation
Engineering

Enc. (7)

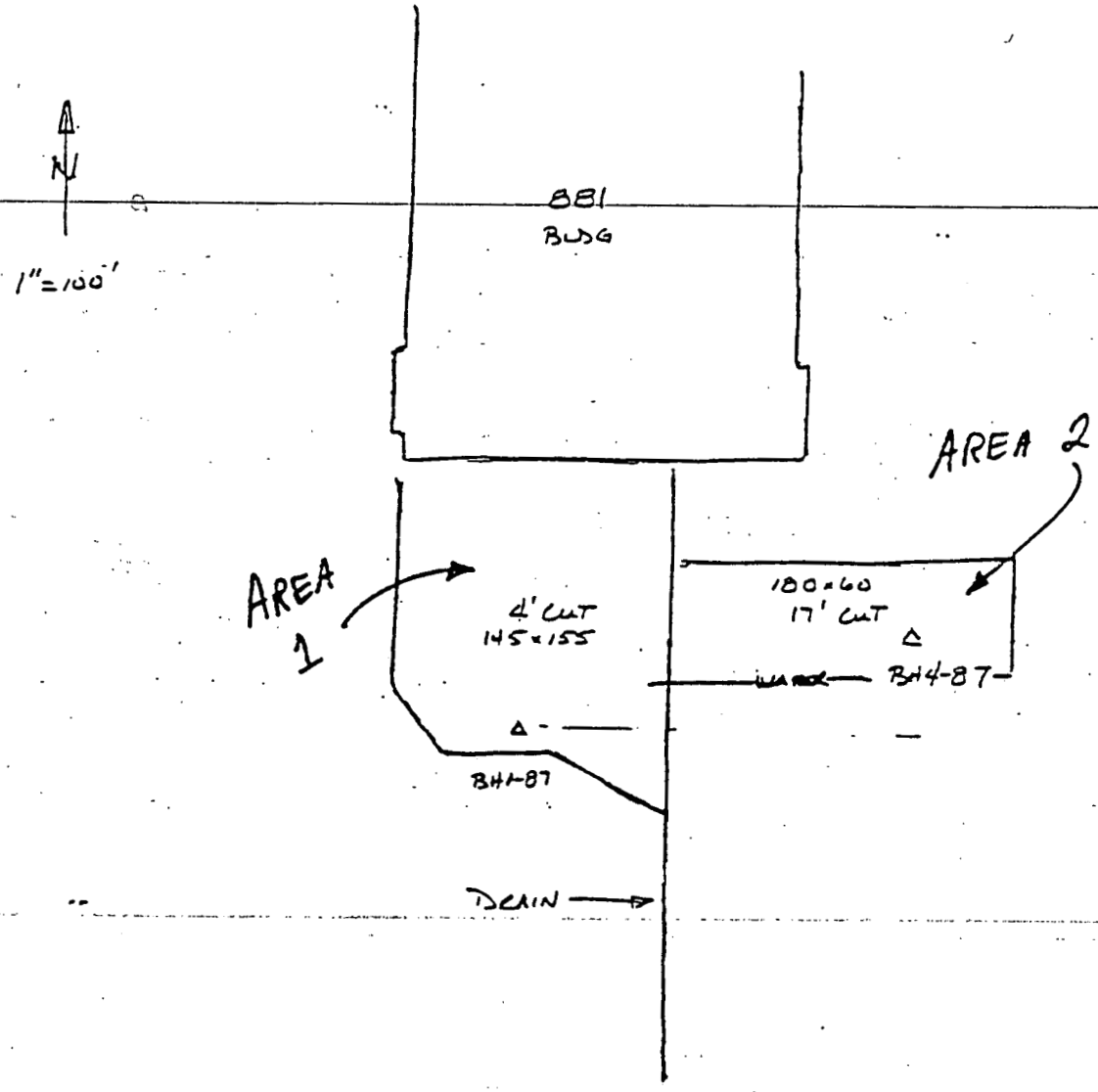
Distribution

M. Anderson - Consultant
B. P. Doty - Consultant
T. C. Greengard - Rocky Flats
A. J. Kallas - Rocky Flats
S. C. McGlochlin - Rocky Flats
S. A. Pettis - Rocky Flats
R. E. Richardella - Rocky Flats

ENCLOSURE 1

SWMUs 103, 106 & 107

EXCAVATION AREAS, DEPTHS & VOLUME ESTIMATE



BH 1-87: 2' of clayey over claystone (volatiles to 4')

BH4-87: 15' of clayey over claystone (volatiles to 15')
GW @ 10.5'

Soil Gas Results
TCE
DCE
TCA
PCE

Therefore, for soil excavation, cut 2' of Bedrock

$$Vol_{in\ place} = [145 \times 155 \times 4 + 100 \times 60 \times 17]\ ft^3 \times \frac{yd^3}{27\ ft^3} = 10,130\ yd^3$$

$$Vol_{Bulked} = Vol_{in\ place} \times 1.1 = 11,000\ yd^3$$

BFD
08/13/87

SWMU 119.1

EXCAVATION

ENCLOSURE 2

MAXIMUM EXCAVATION DEPTH = 15' @ 9-74 (DEPTH ASSUMED)

USE AVERAGE IN VOLUME CALC.

BORING	SOIL THICKNESS (FT)
BH9-87	11.3
BH12-87	3.35
BH14-87	6.5
9-74	15 (ASSUMED)
7-87 BRA	6.3
5-87 BR	10

AVG = 8'

ADD 2' FOR PENETRATION INTO BEDROCK.

AVERAGE DEPTH OF EXCAVATION = 10'

DEEPEST CUT ≈ 17'

VOLUME

AREA APPROXIMATELY A TRIANGLE

470' ALONG ROAD

350' ⊥ ROAD THROUGH ABOUT BH9-87

$$\text{VOL IN PLACE} = \frac{1}{2} \times 470 \times 350 \times 10 \text{ ft}^3 \times \frac{\text{yd}^3}{27 \text{ ft}^3}$$

$$= 30,460 \text{ yd}^3$$

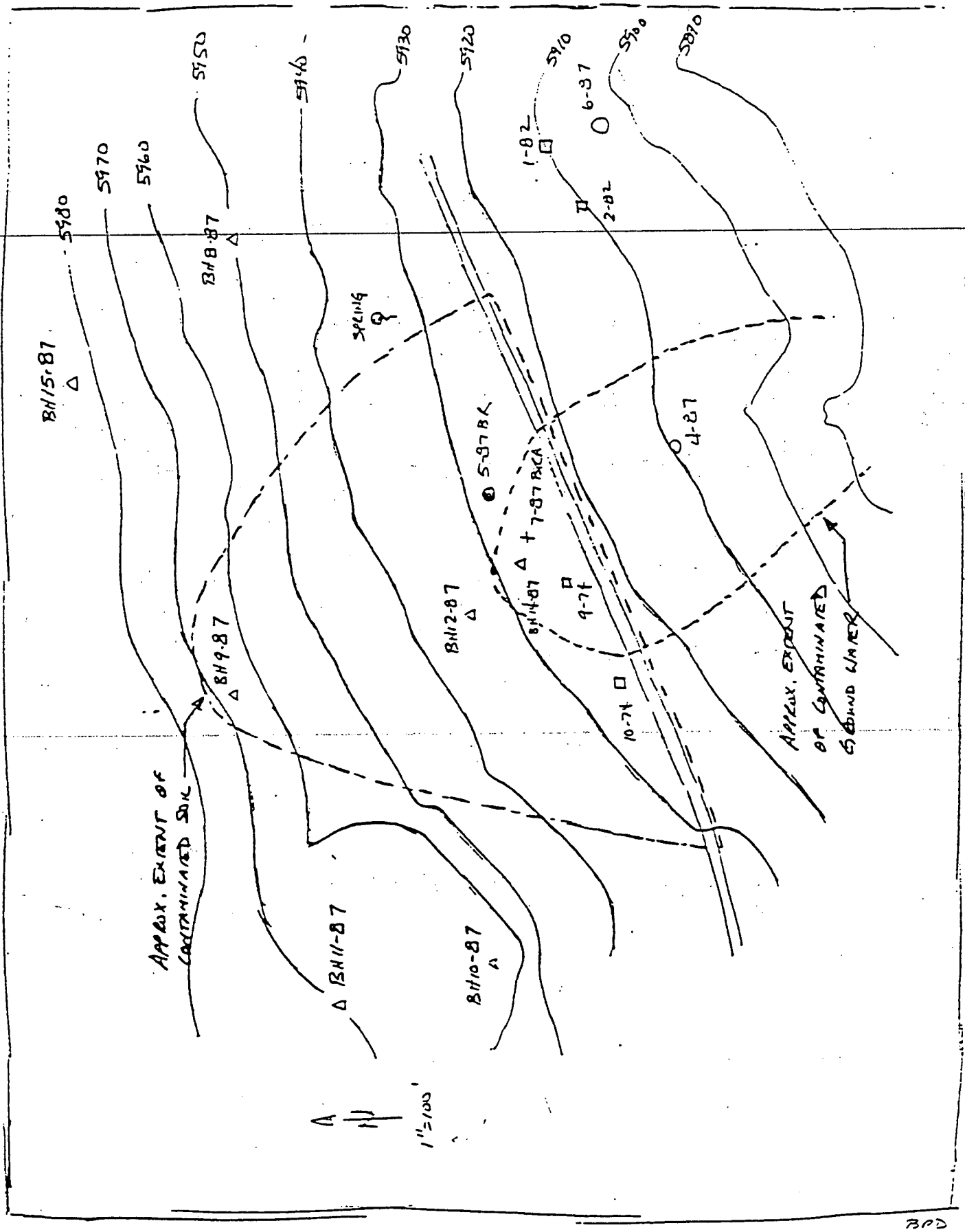
$$\text{VOL}_{\text{EXCAVATED}} = \text{VOL}_{\text{IN PLACE}} \times 1.1 = 33,500 \text{ yd}^3$$

BPD
06/12/07

SWMU 119.1

ENCLOSURE 5

EXTENT OF SOIL & GROUND-WATER CONTAMINATION



BPD
08/13/87

COST BREAKDOWN FOR SWMU 103/106/107, AREA 1

	Item	Cost/Unit	Total Cost	Assumptions*
1.	Excavate and load 1,665 cubic yards gravel	$1.09/cy	$ 1,800	A
2.	Excavate and load 1,665 cubic yards bedrock	$1.43/cy	2,400	A,B
3.	Transport 3,660 cubic yards (4,940 tons) gravel and bedrock	$85/ton	419,900	C,D,E
4.	Disposal costs for 4,940 tons gravel and bedrock	$140/ton	691,600	F
5.	Backfill with 3,660 cubic yards soil from plantsite	$4.69/cy	17,200	G,H
6.	Grade and revegetate 2,500 square yards	$1.00/sy	2,500	L
	TOTAL COST		$1,135,400	

* For list of assumptions, see Enclosure 7.

COST BREAKDOWN FOR SWMU 103/106/107, AREA 2

	Item	Cost/Unit	Total Cost	Assumptions*
1.	Backslope 480 linear feet of pit wall (excavate 2,570 cubic yards gravel)	$1.09/cy	$ 2,800	A,I
2.	Excavate 6,000 cubic yards gravel	$1.09/cy	6,500	A
3.	Excavate 800 cubic yards bedrock	$1.43/cy	1,100	A,B
4.	Two sump pumps	$1,200/mo.	1,200	M
5.	Transport 7,480 cubic yards (10,100 tons) gravel and bedrock	$85/ton	858,500	C,D,E
6.	Disposal costs for 10,100 tons gravel and bedrock	$140/ton	1,414,000	F
7.	Backfill with 2,830 cubic yards uncontaminated backsloping soil	$1.09/cy	8,000	C,H,J
8.	Complete backfilling with 7,480 cubic yards soil	$4.69/cy	35,100	G,H
9.	Grade and revegetate 1,200 square yards	$1.00/sy	1,200	L
	TOTAL COST		$2,328,400	

* For list of assumptions, see Enclosure 7.

COST BREAKDOWN FOR SWMU 119.1

	Item	Cost/Unit	Total Cost	Assumptions*
1.	Backslope 1,310 linear feet of pit wall (excavate 1,550 cubic yards gravel)	$1.09/cy	$ 1,700	A,I
2.	Excavate 24,370 cubic yards gravel	$1.09/cy	26,600	A,K
3.	Excavate 6,090 cubic yards bedrock	$1.43/cy	8,700	A,B,K
4.	Four sump pumps	$2,400/mo.	7,200	N
5.	Transport 33,500 cubic yards (45,230 tons) gravel and bedrock	$85/ton	3,844,600	C,D,E
6.	Disposal costs for 45,230 tons gravel and bedrock	$140/ton	6,332,200	F
7.	Backfill with 1,700 cubic yards uncontaminated backsloping soil	$1.09/cy	1,900	C,H,J
8.	Complete backfilling with 33,500 cubic yards soil	$4.69/cy	157,100	G,H
9.	Grade and revegetate 9,140 square yards	$1.00/cy	9,100	L
	TOTAL COST		$10,389,100	

* For list of assumptions, see Enclosure 7.

ASSUMPTIONS USED FOR COST BREAKDOWN

A = Use front-end loaders.

B = Use backhoes.

C = Volume expansion of 10% after soil is excavated.

D = Density of soils is 100 lb/cubic foot (2,700 lb/cubic yard).

E = Cost for shipping from U.S. Pollution Control, Inc. to their hazardous waste landfill in Grassy Mountain, Utah, 600 miles away.

F = Cost per unit from U.S. Pollution Control, Inc.

G = Assume soil must be moved 2 miles.

H = Compact with earth moving vehicles.

I = Backsloping done on 1:1 grade, to bedrock.

J = Backsloping soil stockpiled near excavation area.

K = Use large construction equipment, such as scrapers.

L = Use hydraulic spray seeding method for revegetation.

M = Rental of sump pump for excavation period of 1 month.

N = Rental of sump pump for excavation period of 3 months.

All other costs are from the Facilities Engineering Cost Estimating Department per Richardsons and Means cost estimating guides.